ID No. CH-12315
- RETURN TO -
INSTRUMENT CONTROL
SYLVANIA SES -- West

INSTRUCTION MANUAL

Telonic

INDUSTRIES, INC

ID No.
CH-12315
- RETURN TO -
INSTRUMENT CONTROL
SYLVANIA SES -- West

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC INDUSTRIES, INC. are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes and semiconductors excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble should be forwarded FIRST, whereupon instructions for correcting the trouble OR authorization for returning the equipment will be given. This applies to all units, whether under warranty or not.

MODEL L-1 / L-1M

SERIAL NO. A 1 1 6 3 5

PLUG IN OSCILLATOR

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CONVERSION INFORMATION

Commencing with equipment shipped after about July 22, 1963, certain modifications have been incorporated in the Telonic SM-2000 plug-in series, and in the Telonic SM-2000 control chassis. These modifications may render the units incompatible with those previously shipped unless the earlier instruments are modified also. The equipment in which these modifications have been made can be identified by the letter "A" prefixed to the serial number.

Units not so identified must be modified if they are to be compatible with instruments now being shipped. The modifications to be made are listed below, divided into two groups - those to be made to earlier SM-2000's and those to be made to earlier plug-ins.

SM-2000 CHANGES

1. On J601, remove all wires presently connected to pin 8 and reconnect them at pin 7; remove the jumper between pins 7 and 8.

2. Using shielded wire, type RG-174/U or equal, connect pin 8 of J601 to the printed circuit board land which leads to pin 1, V303. Ground the shield by connecting it to a convenient ground land nearby.

3. Prefix the letter "A" to the serial number of the instrument.

PLUG-IN CHANGES

1. On P601 remove all wires presently connected to Pin 8 and reconnect them at pin 7; remove the jumper between pins 7 and 8 if one is connected.

2. Prefix the letter "A" to the serial number of the instrument, if none is prefixed.

Changing the serial number of the instrument is as important in the modification as are the electrical requirements, as the ability to identify a unit as having been or not having been modified is involved.

SECTION I .. SPECIFICATIONS

MODELS L-1 and L-1M

INTRODUCTION

This unit is a plug-in sweep oscillator unit for use with designated Telonic control chassis. All the features of the control chassis are utilized with this unit, including the sweep ratio and sweep rate functions.

The L-1M includes a variable marker covering the entire swept range. This difference is clearly indicated throughout the manual.

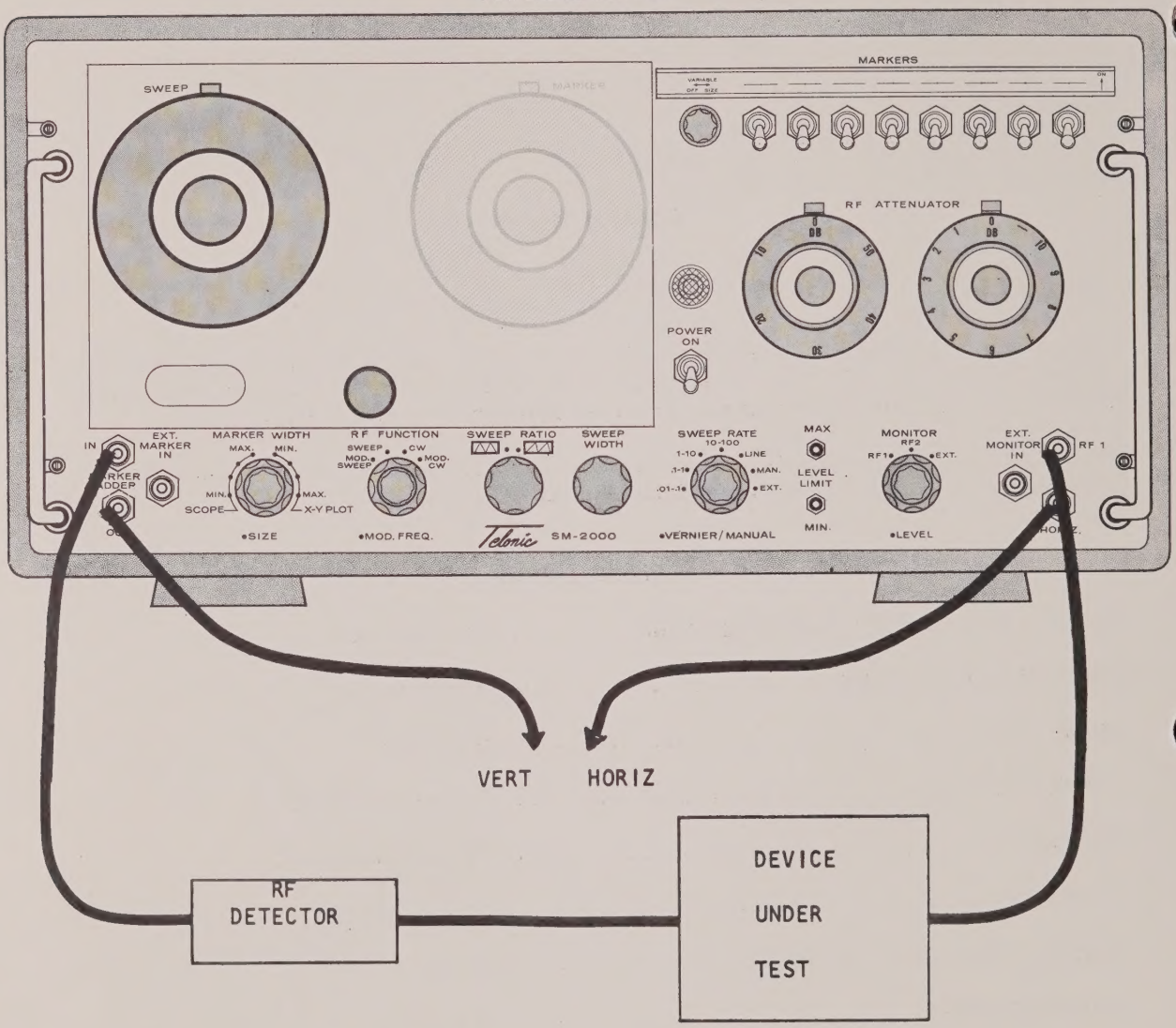
SPECIFICATIONS

*CW AND SWEEP CENTER FREQUENCY RANGE	400-1800 kc
*SWEPT FREQUENCY RANGE	320-2160 kc
SWEEP WIDTH	0.05-40%
OUTPUT VOLTAGE	1v rms into 50Ω
FLATNESS	± 0.25 db overall
LINEARITY	1.2:1 or better
VERNIER LEVEL CONTROL RANGE	0-6 db
VARIABLE MARKER	
Frequency Range	300-2400 kc
Accuracy	± 0.45%

*With 50Ω termination

SECTION II .. OPERATING INSTRUCTIONS

TYPICAL SET UP



The front panel contains two controls:

SWEEP — The Sweep Dial, which sets the center frequency of the sweep oscillator by means of a variable capacitor.

MARKER — The marker Dial, calibrated in three ranges to cover the swept range of the sweep oscillator.

GENERAL

1. Make sure the control chassis power is OFF before inserting the plug-in oscillator into the control chassis. If the power is ON, transient voltages may damage diodes in the units. Insert plug-in oscillator and secure it in the chassis by tightening the fastening rod with the knob in the lower center of the front panel.

2. Make connections to the scope (or recorder), the device under test, and RF Detector as shown. All connectors located on the sweep generator are BNC type and it is recommended that RG cable be used for all connections. This insures good ground connection between the devices, minimizes hum, radiation from unit and pick up of spurious external signals. The cable that is used to connect the RF OUTPUT to the device under test should match the impedance of the sweep generator or else a matching network should be used to insure a constant input signal.

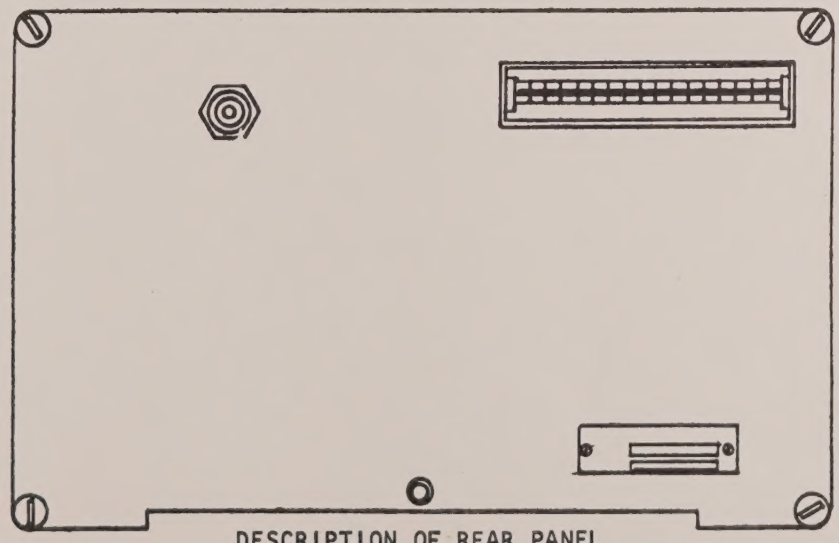
3. Refer to the manual for the c. trol chassis for additional instructions.

4. To insure proper operation of both units, refer to Section IV (CALIBRATION PROCEDURE) of both manuals. It is particularly important that the MAX and MIN LEVEL controls be set as prescribed in Section IV of this Manual as these settings vary with individual plug-ins.

5. Proceed in accordance with recommendations of the manufacturer of the device under test concerning alignment, adjustment, and tests. NOTE: The L-1 does not operate satisfactorily in the MOD CW and MOD SWEEP functions.

*The Telonic XD-3A or XD-8A is suitable for this use in a 50Ω system. The XD-4A or XD-9A is recommended in a 75Ω system.

DRAWING OF REAR PANEL



DESCRIPTION OF REAR PANEL

The two electrical connectors on the rear panel are:

A BNC plug, which mates with a BNC jack on the control chassis. This is the RF output connector.

A 32-contact plug which makes the other electrical contacts necessary through a mating jack on the control chassis.

SECTION III .. GENERAL DESCRIPTION

SWEEP OSCILLATOR

The sweep oscillator is a modified Butler circuit with inductive coupling to the output.

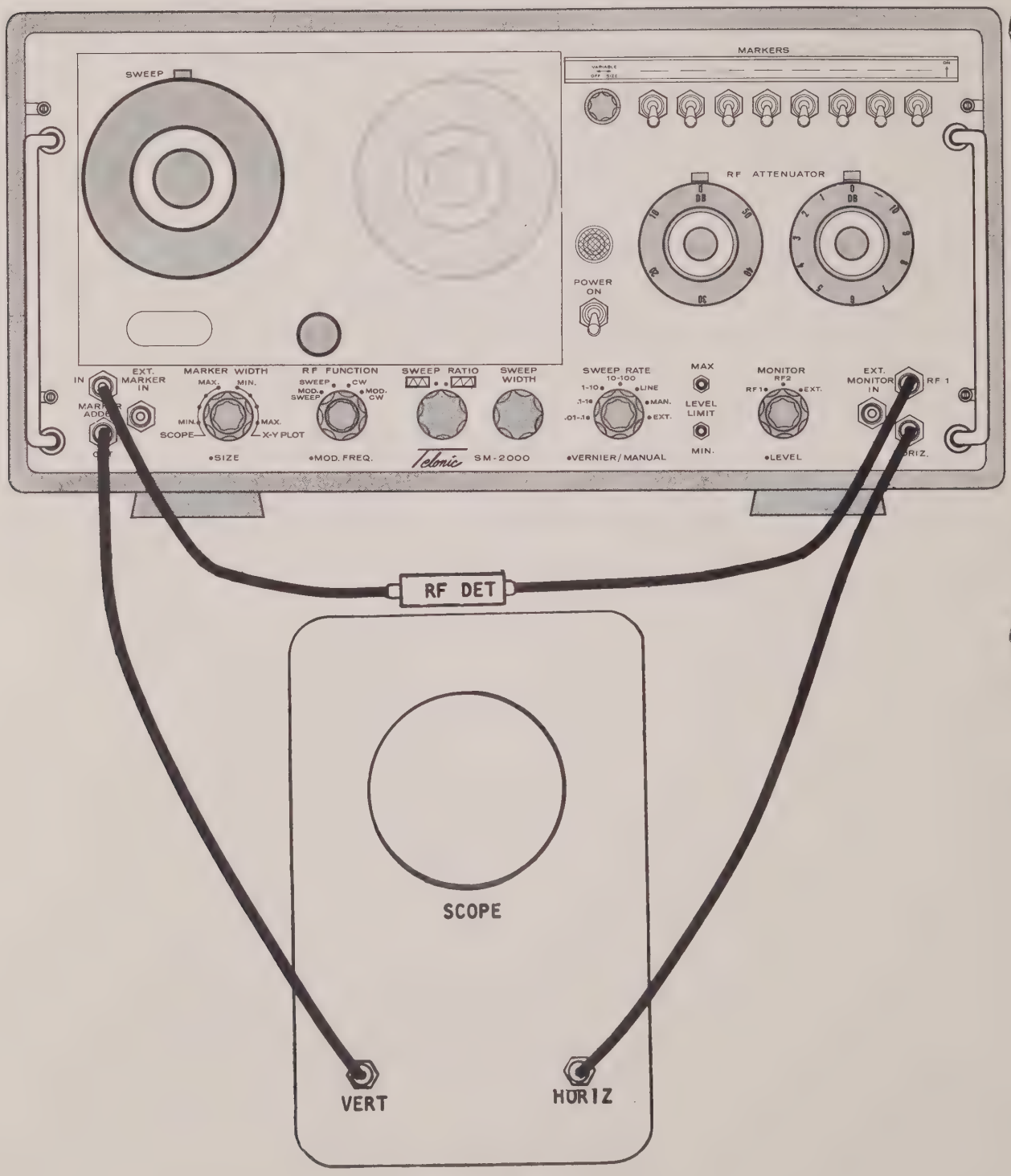
The frequency is swept with a triangular or sawtooth drive (from the control chassis) to a saturable reactor which controls the inductance in the oscillator tank circuit. The oscillator tank capacity is controlled by the front panel SWEEP frequency dial.

The output is leveled by the control chassis as explained in the manual for that unit.

VARIABLE MARKER (L-1M ONLY)

The variable marker oscillator also is a modified Butler circuit. The oscillator operates over the 600-1200kc range. The signal from the marker oscillator is mixed with a sample of the sweep oscillator in a diode mixer circuit, producing beat-notes or "birdies" which are shaped and amplified in the control chassis birdy-by-pass marker system and applied to the demodulated output of the device under test.

SECTION IV .. CALIBRATION PROCEDURE



TYPICAL SET UP

2141L
1/64

GENERAL

The following procedure should be applied after changing any component in the plug-in unit, or at any time the calibration is noted to be incorrect.

Complete calibration involves adjustment of three different classes of controls.

Those located in the plug-in which affect the operation of the control chassis.

Those located in the plug-in and affecting plug-in functions only.

Those located in the control chassis which affect the operation of the plug-in.

The latter class of controls is discussed in the manual for the control chassis. The others are treated here.

TEST EQUIPMENT REQUIRED:

1.0Mc crystal-controlled harmonic marker (such as the Telonic CDH-1.0)
0.1Mc crystal-controlled harmonic marker (such as the Telonic CDH-0.1)
Calibrated RF Detector (such as the Telonic XD-3A)
Oscilloscope

NOTE: For greater accuracy in certain adjustments, a counter may be used, provided that proper termination is maintained.

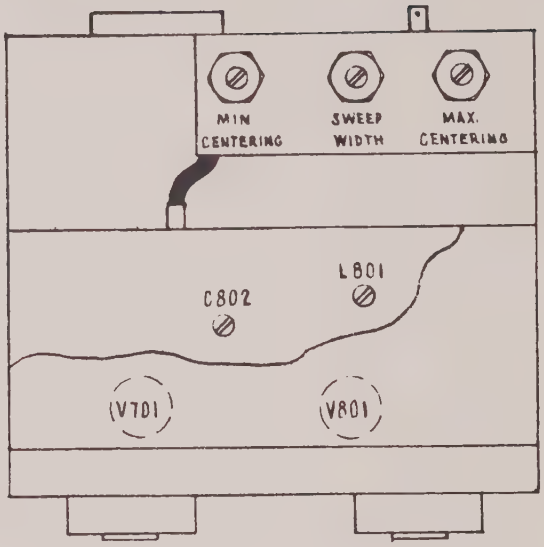
PROCEDURE

1. Make connections as shown.

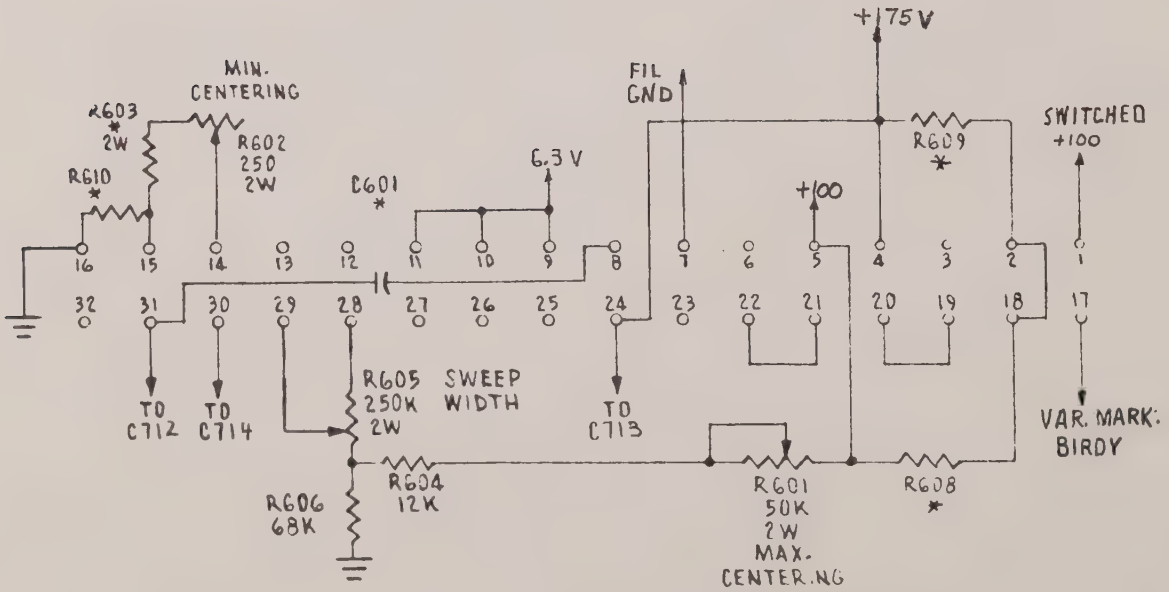
2. Use double-shielded RG cable for all RF connections to insure good connections and minimum radiation, and to avoid pickup of spurious signals. The detector must match the cable, or a matching network must be used.

3. With power OFF, plug in the L-1 and secure it in place.

4. Turn power ON, allow a 15-minute warmup period, and make adjustments as outlined.



CHASSIS LAYOUT



P601

MIN CENTERING (Adjustment)

The MIN CENTERING Control is set for optimum dial accuracy.

1. Preset the following controls:

   Control Chassis
   SWEEP WIDTH - near minimum
   1Mc marker ON
   Variable and other fixed markers OFF

   L-1
   SWEEP Dial to 1Mc

2. Locate the 1Mc marker on the display.

3. Adjust MIN CENTERING Control to center the 1Mc marker on the scope trace.

4. Decreasing the sweep width to minimum with the front panel control, maintain the center of the marker in the center of the trace with the MIN CENTERING Control.

5. Similarly check the dial accuracy at any other desired frequencies, adjusting the MIN CENTERING Control to divide errors, if any, as nearly equally as possible over the range. If desired, this control may be set instead to provide best dial accuracy at a preferred frequency setting.

MAX CENTERING (Adjustment)

This control is set for equal sweep on each side of center frequency at maximum sweep width.

Leaving other controls set as at the conclusion of the MIN CENTERING adjustment, rotate the front panel SWEEP WIDTH knob fully clockwise.

Adjust MAX CENTERING to center the 1Mc marker on the trace.

SWEEP WIDTH (Adjustment)

This adjustment is set to provide 40% sweep width. The percent of sweep width is constant over the range, thus will be 40% at any other center frequency.

Preset the following controls:

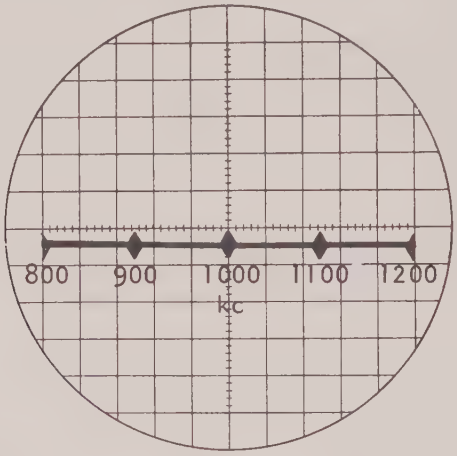
Control Chassis
1.0Mc and 0.1Mc harmonic markers ON
Variable and other fixed markers OFF
SWEEP WIDTH fully clockwise

L-1
SWEEP Dial to 1Mc

CALIBRATION PROCEDURE

After identifying the 0.1Mc harmonics, turn OFF the 1.0Mc marker. Adjust SWEEP WIDTH on the L-1 until 5 markers (800-1200kc) appear on the display. Alternately adjust the SWEEP Dial and SWEEP WIDTH Controls on the L-1 until the 800kc marker is at the left end of the trace and the 1200kc marker is at the right end. See Figure below.

Now readjust MAX CENTERING, then MIN CENTERING, as above if necessary.

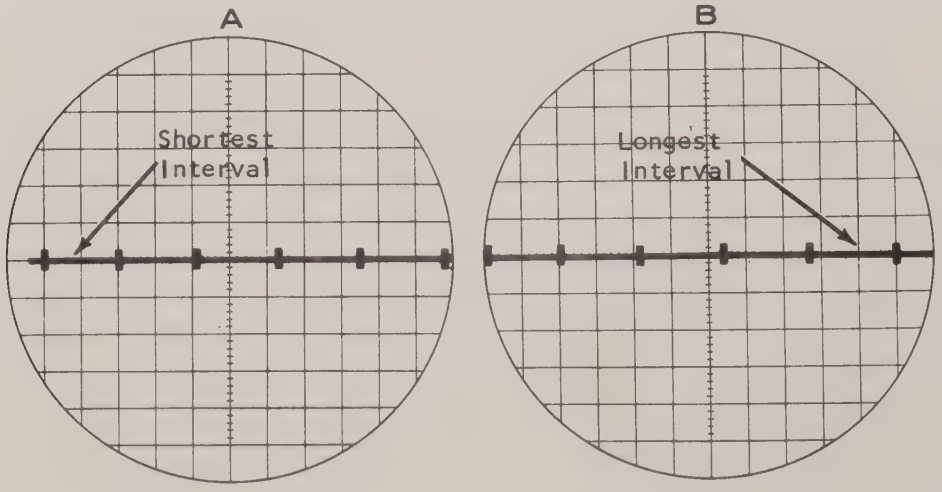


LINEARITY CHECK

Linearity measurements are made at 40% sweep width.

With other controls set as at the conclusion of the SWEEP WIDTH adjustment, set the SWEEP Dial to the point (about 1250kc) at which 5 marker intervals occupy the full trace.

Locate the shortest marker interval in the display. Adjust the horizontal gain control on the scope so that this interval occupies exactly two scope divisions. See Figure A below. Locate the longest marker interval of the display. Adjust the horizontal position on the scope so that the interval begins on a graticule line. Measure the marker interval. Its length (in scope divisions) is twice the linearity ratio: A length of 2.30 scope divisions for the longest marker interval represents a linearity of 1.15 to 1. See Figure B below.



LEVEL LIMIT (MAX and MIN) (Control Chassis)

Preset the following controls on the control chassis:

LEVEL fully clockwise
SWEEP WIDTH fully clockwise
MONITOR in RF 1 position
SWEEP RATE to LINE
SWEEP RATIO to ⩘

Using the MAX LEVEL LIMIT control as a vernier, set the output at 1v rms. This corresponds to an XD-3A (or XD-4A) output of about 1.1v d.c.

Insert fixed attenuation, not to exceed 6 db, in an amount equal to the desired range of the level control and note the output level.

Reset the attenuators to the 0 db position and rotate the LEVEL control fully counter-clockwise. Adjust MIN LEVEL LIMIT Control for the same output that was noted with 6 db of fixed attenuation.

FLATNESS CHECK

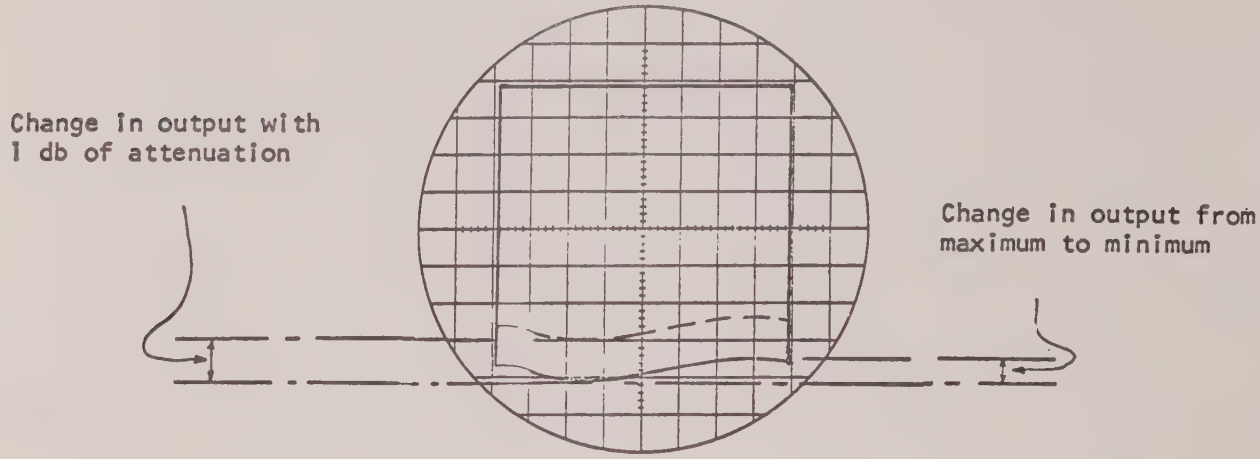
Flatness is measured over the entire swept range of the L-1; the minimum output must be not more than 0.5 db lower than the maximum over this range.

Preset the following controls:

SWEEP WIDTH fully clockwise
RF LEVEL fully clockwise
All markers OFF
MONITOR SELECTOR to RF 1
NOTE: Be sure the LEVEL MAX and MIN Controls are adjusted as prescribed above.

Rotate the SWEEP Dial through its calibrated range, noting the maximum and minimum outputs.

Compare the difference between these outputs with the reduction in output resulting from the insertion of 1 db attenuation. The difference between the maximum and minimum must be no greater than half the change caused by the 1 db attenuation.



VARIABLE MARKER

NOTE: Refer to chassis layout for location of C802 and L801. These adjustments are made with the bottom cover ON.

Preset the following controls (all marker settings are read on center scale):

Control Chassis
SWEEP WIDTH about 50 kc
RF LEVEL to maximum
0.1 Mc marker ON

L-1M
SWEEP Dial to 600 kc
MARKER Dial to 600 kc

Adjust T801 to superimpose the variable marker over the fixed marker at 600 kc.

Reset the L-1M controls as follows:

SWEEP Dial to 1200 kc
MARKER Dial to 1200 kc

Adjust C802 to superimpose the variable marker over the fixed marker at 1200 kc.

Repeat the above procedures until the markers are superimposed at each end of the frequency range each time the dials are set as prescribed.

If inaccuracies are noted at other settings, readjust T801 and/or C802 to divide error equally across the range. These controls may be set instead for best accuracy at a preferred frequency if desired.

SECTION V .. MAINTENANCE

GENERAL PROCEDURE

Since this model is a plug-in unit, many of the possible malfunctions of the oscillator are the result of part failure in the control chassis. The connections at P601 of the plug-in and at J601 of the control chassis afford a convenient means of tracing the source of troubles to the oscillator or chassis.

In locating troubles which have been traced to the oscillator, application of the common rules of electronic maintenance, including a visual check for damage, open filaments, glowing anodes, shorted tuning capacitors, and charred resistors, is an obvious measure. All connectors, particularly P601 and J601, should be checked for cleanliness.

EXTENSION CABLE

For maintenance work requiring access to parts located on the under side of the plug-in, or in other areas not easily reached, an extension cable may be obtained from Telonic Industries, Inc. This cable, having the 32-contact plug on one end and the 32-contact jack on the other, allows the plug-in to be removed from the control chassis and operated on the bench.

ACCESS TO RF COMPARTMENT

There are four unlacquered screws on the cover to the RF compartment. Only these should be removed in taking off the cover.

The lacquered screws hold the shield in place and have nothing to do with securing the cover.

The following chart will be of service in deciding whether a trouble lies in the oscillator or control chassis.

SYMPTOM	CHECK (on P601)
Weak or no output or unleveled output	DC voltage at Pin 31 with RF LEVEL fully clockwise.
No sweep width	1. Voltage waveform, Pin 14 to ground.
	2. Next - resistance between Pins 14 and 15, 28 and 29, 30 and 4 with plug-in removed.
Changing sweep width also changes center frequency	Resistance from Pin 28 to Pins 5, 29, and 16 with plug-in removed.
No variable marker	1. For birdy at Pin 17
	2. DC voltage at Pin 1

If the chart shows that the trouble probably is in the control chassis, refer to the Maintenance Section of the manual for that unit.

If the trouble appears to be in the plug-in, the following chart may be of assistance in localizing the failure:

SYMPTOM	CHECK
Weak or no output or unleveled output	V701 and associated circuitry. Continuity from Pin 31 of P601 to Pin 1 or 6 of V701.
No sweep width	Check R602, R603, R605, and L701A.
Changing sweep width changes center frequency	Check R601, R604, R605, and R606 first for open, second for changed value.
No variable marker	Check V801 and associated circuitry, including sweep sample line. Change diode in mixer circuit and check other mixer components.
Weak Marker	Diode in mixer circuit. V801 and associated circuitry. Sweep sample line. If markers on one range are considerably more prominent than those on another, substitute diodes to optimize all.
Spurious Markers	Check mixer diode and change if necessary. Be sure diode is inserted with correct polarity.

It is assumed that the above procedures have been applied and that the jumpers on P601 are intact. Where "inconclusive" is shown, the next step should be followed.

IF RESULT IS	TROUBLE PROBABLY IN	
	OSCILLATOR	CONTROL CHASSIS
High 100-175v	X	
Low or zero 0-100v		X
Sawtooth or triangular waveform	X	
OV or DC voltage	Inconclusive,	See Check #2
Open on any check	X	
Continuity		X
Open on any check	X	
Continuity		X
Birdy Present		X
No birdy	Inconclusive.	See Check #2
100v	X	
Low or no voltage		X

SCHEMATIC PART DESIGNATION

C	Capacitor
CR	Crystal Rectifier, Germanium Diode
J	Jack
L	Inductor
P	Plug
R	Resistor, Fixed or Variable
V	Tube

SCHEMATIC VALUE ABBREVIATION

Ω	ohms
K	1,000 ohms
M	1,000,000 ohms (megohms)
µf	Microfarad
µµf, pf	Picofarad
µh	Microhenry
mh	Millihenry

OTHER ABBREVIATIONS

F.P.	Front Panel
R.P.	Rear Panel
T.P.	Test Point

RESISTORS - All resistors are 1/2 watt, ± 10%, and are shown in ohms, unless otherwise specified.

CAPACITORS - All capacitors are shown in picofarads (pf) unless otherwise specified.

COILS - All inductors are shown in microhenries (µh) unless otherwise specified.

CIRCUIT REFERENCE SYMBOL - LOCATION INFORMATION

001 - 699	interconnecting elements	701 - 799	Sweep Oscillator
		801 - 899	Variable Marker

* Indicates value of component adjusted at factory, and may deviate from value shown on print.

SECTION VI .. PARTS LIST

L-1 PARTS LIST

CIRCUIT REF.	DESCRIPTION	TELONIC PART NO.
C601	CFC (SC)	None
*C701	CVA, 500pf	C-421
*C702	CFC, 20pf, ±10%, 1000VDCW(SC)	C-8
C703	CFC, 0.04µf, -80-20%, 500VDCW(SC)	C-53
C704-C713	CFCF, 1000pf, +100-0%, 500VDCW	C-110
C714	CFCF, 470pf, ±20%, 500VDCW	C-111
P601	Plug, 32-contact	S-39
J701	RJ	J-10
P701	PC, UG-88B/U	J-32
P702	PC	J-27
*L701	Reactor, saturable	None
L702	IF, 1mh	L-116
L703	IF, 10µh, ±10%	L-107
L704	IF, 4.7µh, ±10%	L-105
L705	IF, 10mh	L-110
L706	IF, 500µh, ±10%	L-109
L707	Not assigned	
L708	Same as L705	
L709	IF, 2.2µh, ±10%	L-101
L710	Same as L709	
R601	RVC, 50KΩ, ±10%, 2W	R-751
R602	RVC, 250Ω, ±10%, 2W	R-771
R603	RFC, 2W (SC)	None
R604	RFC, 12KΩ, ±10%, 1/2W	R-119
R605	RVC, 250KΩ, ±10%, 2W	R-752
R606	RFC, 68KΩ, ±10%, 1/2W	R-51
R607	Not assigned	
R608	RFC (SC)	None
R609	RFC (SC)	None
R610	RFC (SC)	None
*R701	RFC, 6.8KΩ, ±10%, 1/2W	R-80
*R702	RFC, 15KΩ, ±10%, 1/2W	R-66
R703	RFC, 100Ω, ±10%, 1/2W	R-15
R704	RFC, 39KΩ, ±10%, 1/2W	R-26
R705	RFC, 680Ω, ±10%, 1/2W (SC)	R-59
V701	TE, 12BH7A	VT-14
	Socket, tube, 9-pin	S-31

*This part must be replaced at the factory if dial accuracy is to be maintained.

VARIABLE MARKER (L-1M ONLY)

CIRCUIT REF	DESCRIPTION	TELONIC PART NO.
*C801	CVA, dual, 500/500 pf	C-421
*C802	CVC, 2-12 pf	C-432
C803	CFC, 470 pf, GMV, 1000VDCW	C-18
*C804	CFC, 100 pf, ±10%, 1000VDCW	C-13
C805	CFC, 2000 pf, +20-0%, 1000VDCW	C-133
C806	Not assigned	
C807	CFC, 0.02 µf, +80-20%, 500VDCW	C-21
C808	Same as C807	
C809	CFCF, 1000 pf, +100-0%, 500VDCW	C-110
C810	Same as C809	
CR801	DS, 1N82	D-1
L801	IV	None
L802	IF, 25µh	L-113
L803	IF, 1mh	L-116
R801	RFC, 100Ω, ±10%, 1/2W	R-15
R802	RFC, 4.7KΩ, ±10%, 1/2W	R-21
R803	Not assigned	
R804	RFC, 1.2KΩ, ±10%, 1/2W (SC)	R-92
R805	RFC, 4.7KΩ, ±10%, 1W	R-220
R806	RFC, 1KΩ, ±10%, 1/2W	R-18
R807	RFC, 820Ω, ±10%, 1/2W	R-135
V801	TE, 6J6	VT-7
	Socket, tube, 7-pin	S-32
	Clip, diode	

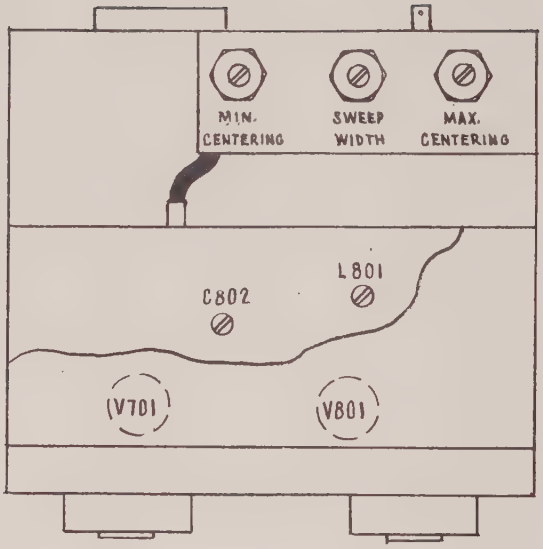
*This part must be replaced at the factory if specified dial accuracy is to be maintained.

ABBREVIATION CODE

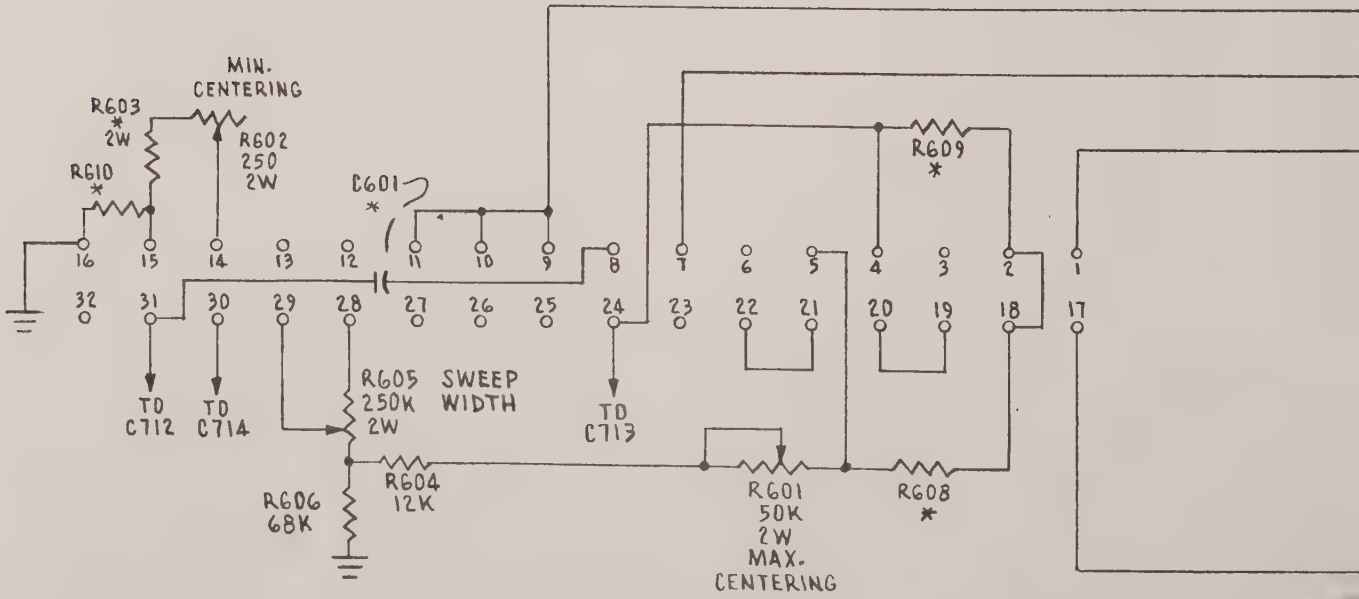
CFC	Capacitor, fixed, ceramic
CFCF	Capacitor, fixed, ceramic feedthru
CVA	Capacitor, variable, air
CVC	Capacitor, variable, ceramic
DS	Diode, semiconductor
IF	Inductor, fixed
IV	Inductor, variable
PC	Plug, cable
RFC	Resistor, fixed, composition
RJ	Receptacle, jack
RVC	Resistor, variable, composition
SC	Subject to change
TE	Tube, electron

SECTION VII

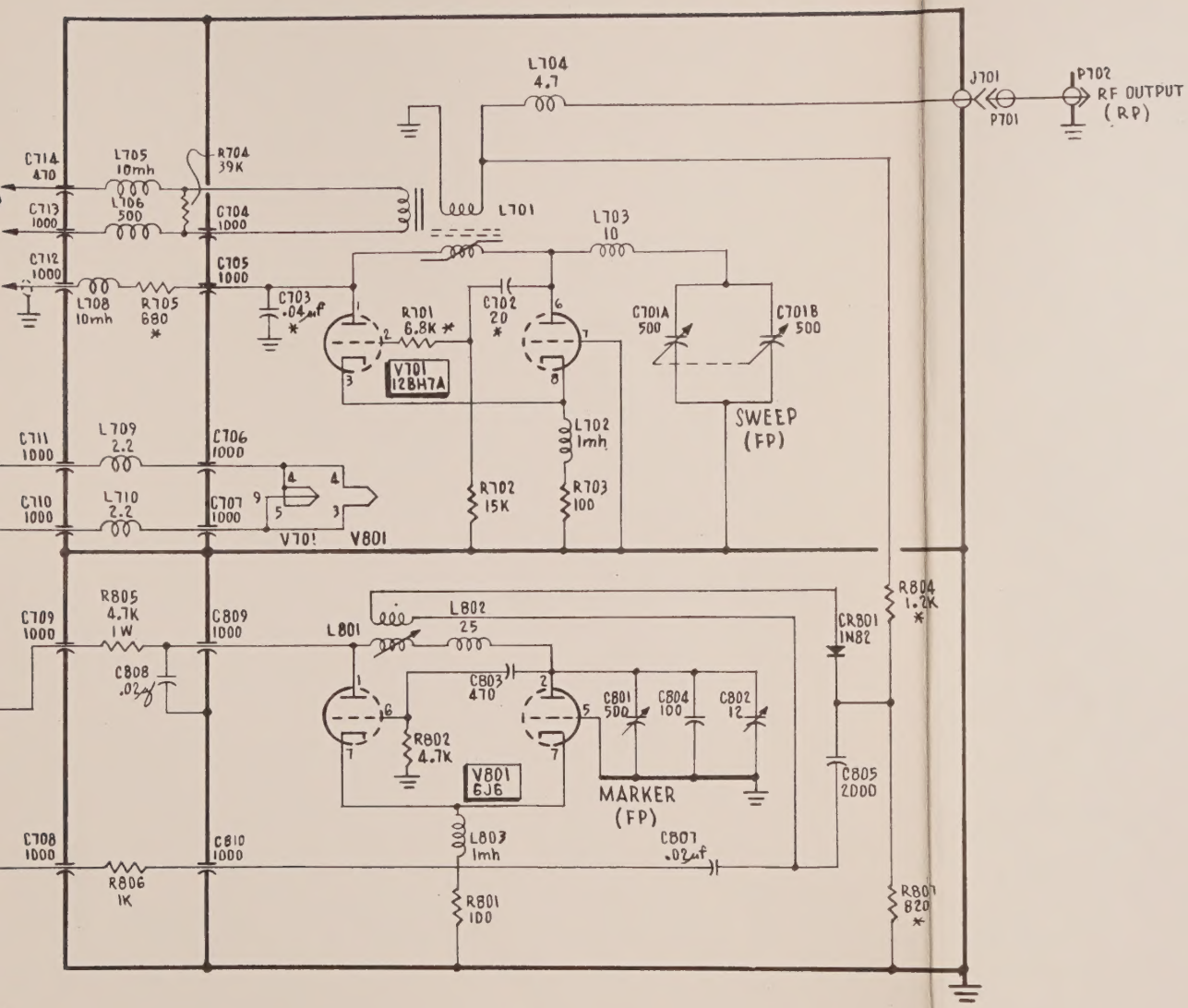
SCHEMATIC DIAGRAMS

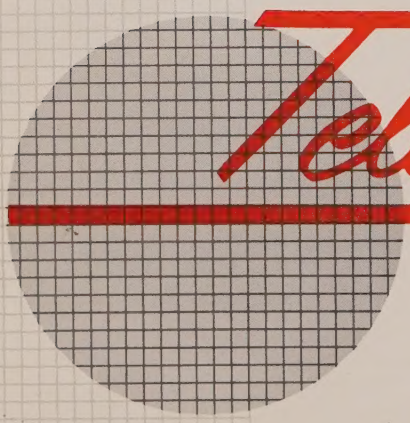


CHASSIS
LAYOUT



P601


L704
4.7
J701
P702
RF OUTPUT
(RP)
P701
C714
470
L705
10mh
R704
39K
L706
500
C713
1000
C704
1000
L701
L703
10
C712
1000
C705
1000
L708
10mh
R705
680
*
C703
.04 mf
*
R701
6.8K *
C702
20
*
C701A
500
C701B
500
V701
12BH7A
SWEEP
(FP)
L702
1mh
C711
1000
L709
2.2
C706
1000
R702
15K
R703
100
C710
1000
L710
2.2
C707
1000
V701
V801
R804
1.2K
*
R805
4.7K
1W
C709
1000
C809
1000
L801
L802
25
CR801
1N82
C808
.02
C803
470
C801
500
C804
100
C802
12
R802
4.7K
V801
6J6
MARKER
(FP)
C805
2000
C708
1000
C810
1000
L803
1mh
C807
.02mf
R806
1K
R801
100
R807
820
*



Telonic INDUSTRIES INC.

BEECH GROVE, INDIANA

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